

## CLAIMS

What is claimed is:

1. A package comprising a product and an authenticating agent incorporated into the package, wherein the authenticating agent is a substance that forms detectable free radicals upon irradiation.

2. The package of claim 1, further comprising one or more packaging materials, wherein the authenticating agent is incorporated in the packaging material.

3. The package of claim 2, wherein the packaging material comprises a polymeric packaging film, said authenticating agent being incorporated in said film.

4. The package of claim 1, wherein the authenticating agent comprises at least one of an amino acid, a sugar, and an amine salt of an organic acid.

5. The package of claim 4, wherein the authenticating agent comprises alanine.

6. The package of claim 1, wherein the product comprises at least one of a food product and a beverage product.

7. A method of making a package, comprising:  
incorporating an authenticating agent into a component of the package as an in situ product marker, wherein the authenticating agent is a substance that forms detectable free radicals when exposed to ionizing radiation, said authenticating agent being present in a manner such that the free radicals provide a characteristic spectral response when subjected to a spectroscopic analysis capable of detecting free radicals in order to allow information indicative of the source of the package to be determined from said spectral response.

8. The method of claim 7, wherein the component comprises a packaging material, and wherein the authenticating agent is incorporated into the packaging material.

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9. ~~The method of claim 8, wherein the packaging material comprises a polymeric packaging film, and wherein the authenticating agent is incorporated into said film.~~

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10. The method of claim 7, wherein the authenticating agent comprises alanine.

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11. A method of analyzing a sample to determine if the sample contains an authenticating agent that forms free radicals upon irradiation with ionizing radiation, comprising:

exposing the sample to a dosage of ionizing radiation;

subjecting the irradiated sample to a spectroscopic analysis effective to provide a spectroscopically derived output indicative of the presence, if any, of the free radicals;

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determining whether the sample contains the free radicals from information comprising the spectroscopically derived output of the sample.

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12. The method of claim 11, further comprising subjecting an irradiated reference to the spectroscopic analysis to obtain a spectroscopically derived reference output, wherein the irradiated reference comprises the free radicals, and wherein the information of the determining step further comprises the spectroscopically derived reference output.

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13. The method of claim 11, wherein the spectroscopic analysis is electron spin resonance spectroscopy.

14. The method of claim 11, wherein the ionizing irradiation comprises at least one of gamma radiation, electron beam radiation, corona discharge, plasma discharge, X-rays and microwave energy.

5 15. The method of claim 11, wherein the authenticating agent comprises alanine.

16. An authenticating system, comprising:  
 an authenticating agent comprising a substance that forms free radicals  
 10 upon exposure to ionizing radiation;  
 reference information derived from data comprising the spectroscopically derived output resulting from spectroscopic analysis of an irradiated reference sample, said irradiated reference sample comprising the free radicals;  
 a source of ionizing radiation that irradiates a sample to be authenticated  
 15 with an amount of ionizing radiation; and  
 a spectroscopic system effective to provide a spectroscopically derived output of a sample to be authenticated, said output being indicative of the presence, if any, of the free radicals in the sample to be authenticated.

20 17. The authenticating system of claim 16, wherein the ionizing irradiation comprises at least one of gamma radiation, electron beam radiation, corona discharge, plasma discharge, X-rays and microwave energy.

25 18. The authenticating system of claim 16, wherein the spectroscopic system comprises an electron spin resonance spectroscopy system.

19. The system of claim 16, wherein the authenticating agent comprises at least one of an amino acid, a sugar, and an amine salt of an organic acid.

30 20. The system of claim 19, wherein the authenticating agent comprises alanine.

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